

Conservation Opportunities and Challenges outside Las Nubes and Los Cusingos in Southern Costa Rica

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Abstract

In this paper, I report on research conducted outside two small protected areas in Southern Costa Rica: Los Cusingos Neotropical Bird Sanctuary and Las Nubes Biological Station. I identify potential conservation opportunities (shade grown coffee) and challenges as well as report on information gleaned from interviews with local producers, environmental non-governmental groups and community groups. A renewed interest in shade coffee exists among a small number of producers as an ecologically sustainable land use practice.

Introduction

Internationally Costa Rica is often hailed as an ‘example’ or ‘model’ because of its national protected areas system and conservation programs (see Evans, 1999; Hartshorn et al. 1982; and Watson *et al.*, 1998). An equivalent of 31% of its national territory is in some form of protected area including 16% specifically designated as national parks (Watson *et al.* 1998). However, deforestation rates as well as degradation both inside and outside of protected areas lend support to the assertion that protected areas alone are inadequate in conserving biodiversity (Sánchez-Azofeifa *et al.* 1999).

As in many tropical regions, Costa Rica’s, “complex social, political and economic problems are driving an accelerated process of degradation and disruption of the wide variety of natural habitats and ecosystems present in the region” (Gámez, 1994:35). In response to this challenge, Costa Rica has evaluated its past conservation strategies and designed a biodiversity conservation program based on a premise “that the only way to save tropical biodiversity is to use it sustainably, for intellectual, spiritual or economic purposes” (Gámez, 1994:35). Furthermore, the program recognizes that Costa Rica “needs a new style of development that improves the quality of life...while conserving the vitality and diversity of life on earth” (Gámez, 1994:35). Not only have Costa Ricans outlined a national vision for conservation and development but they have also have taken into account environmental degradation occurring outside protected areas and have made this a national concern as well (Gámez, 1994).

My research is in response to environmental degradation occurring outside two protected areas: Los Cusingos Neotropical Bird Sanctuary and Las Nubes Biological Station¹. Located in southern Costa Rica, Los Cusingos is connected to the mid-elevation rain forest Las Nubes by a largely deforested corridor dedicated primarily

to small-scale cattle production, coffee and subsistence crops. From 1992 satellite images of the area surrounding Las Nubes and Los Cusingos, it is evident that there have been dramatic changes in land use since 1984 (See Figures 1 and 2). One of these changes is the significant loss of primary forests in the areas adjacent to Los Cusingos. There is an urgent need for the design and implementation of ecologically sustainable practices within this corridor.

The specific objectives of this research include:

- To examine why changes in land-use have occurred in this region
- To examine present land-use and land tenure, including the social, socio-economic and political contexts
- To understand farmers' perspectives on sustainable practices in coffee
- To lay the groundwork for future research and conservation possibilities in the region.

Place and Context of Study

The study region is located in the cantón² of Pérez Zeledón in southern Costa Rica (Figure 3). Pérez Zeledón is one of 90 cantónes in Costa Rica. It has an approximate area of 1900 km² and in 1990 had a population of 81,500 (Sick, 1999). San Isidro is the bustling commercial centre of southern Costa Rica and is one of the fastest growing coffee regions in the country (Sick, 1999).

Located approximately ten kilometers outside of San Isidro, the study region includes the land and communities between the two protected areas, Los Cusingos Neotropical Bird Sanctuary and Las Nubes Biological Station and, the river connecting these two, the Peñas Blancas. The two main communities in the area are Santa Elena and Quizarrá (see Figure 1). Santa Elena has a population of 734 and Quizarrá has a population of 325 (Ministry of Health, 1999). They are located at elevations of 800 masl and 700 masl.

What sets these communities apart from others in Pérez Zeledón is the presence of world famous ornithologist, Dr. Alexander Skutch, former owner of Los Cusingos Neotropical Bird Sanctuary who still lives on the same farm he purchased nearly 60 years ago. Los Cusingos is a 72 ha property classified as premontane wet forest under the Life Zone Classification System (Holdridge, 1979). Currently primary forest comprises 50% of the farm and Los Cusingos is the one of the "largest remaining tracts of forest in the valley" (Skutch, 1992:337). Dr. Skutch has identified 307 species of birds at Los Cusingos, has published over 30 books, hundreds of articles and has received numerous honours and awards making him one of the foremost authorities on the subject of tropical birds. He has also noted a concomitant decline in bird species over several decades in Los Cusingos.

In 1998 124.37 ha of Costa Rican rain forest, Las Nubes, located just 6 km north of Los Cusingos, was donated to York University's Faculty of Environmental Studies

(FES). This generous donation by Toronto doctor, Dr. Woody Fisher, initiated a series of events including a partnership between the Tropical Science Centre and FES to protect the remaining biodiversity of Las Nubes and Los Cusingos.

Las Nubes is classified as premontane rain forest³ under the Life Zone Classification System (Holdridge, 1979). Its boundaries begin at an elevation of approximately 900 masl and continue up to 1500 masl. Part of the Las Nubes property overlaps with Chirripó National Park. Chirripó covers an area of 50 150 ha. The Peñas Blancas River, that connects Las Nubes to Los Cusingos, originates within this national park in Lake Chirripó. Chirripó National Park is part of La Amistad Biosphere Reserve that covers 12% of the country and extends into Panama. Research conducted outside the protected areas of Los Cusingos and Las Nubes has the potential to support the inclusion of Los Cusingos in La Amistad Biosphere Reserve.

Summary of Research Methods and Field Work

From February-July 1999 and for six weeks in January-February 2000, I conducted fieldwork on landscape and landuse change in southern Costa Rica. The principal research methods were the use of aerial photographs, qualitative research methods including semi-structured interviews and guided conversations, participatory mapping techniques facilitated in community meetings, community meetings and the gathering of secondary sources on land use systems, ecologically sustainable land use practices and deforestation in Costa Rica. Eighteen semi-structured interviews were conducted with small producers and residents in 1999. All of the interviews were conducted jointly with Sandra Znajda⁴, a Canadian graduate student also conducting research in the study region at the time. Five community meetings were held over the course of the six-month research period in 1999 and over two months in 2000.

Summary of key findings

Landscape Changes Observed From 1984-1992 Outside of Los Cusingos

To investigate the relatively recent loss of primary forests outside of Los Cusingos was one of the objectives of this research. However, it took only a few weeks for an unexpected explanation to emerge. I learned that primary forests haven't existed outside of Los Cusingos in over forty years and that the question I was asking was based on erroneous information. Each time I inquired with residents and landowners the same answer was given. The maps are wrong. Aerial photographs taken in 1972 and 1980 of the study region confirm and support what residents and landowners assert. The question then became why are these maps inaccurate? Dr. Julio Calvo, Executive Director of the Tropical Science Centre, confirmed that the maps were made from a 1:200000 LANDSAT image by the Ministry of Agriculture and Livestock (MAG) and an accurate interpretation system was never applied to them. Instead, in a highly arbitrary process, MAG extrapolated from the LANDSAT image⁵ to an approximate area of 12 x 6 kilometers. Once it was confirmed that the maps are inaccurate, I then focused on the land use systems and the two main

communities in the region.

Land Tenure and Land Use Systems in the Study Region

When describing farms in the study region, I utilized the classification system devised by Rice (1993). A description of sizes of the farms visited during the interviews is presented in Table 1. Five hectares appears to be a key value because on farms of less than five hectares, the ability of the crop production to support a family is limited and may not be adequate. Many members from farms on less than 5 ha are often forced to seek additional sources of income and in some cases, by working as labourers on other larger farms (Hall, 1985).

Table 1. Land distribution of participants from the interviews (n=18). Total number of farms visited (n=16) because two interviews were conducted with father-son pairs occupying the same farm. Based on a classification system by Rice (1993).

<i>Size of farm</i>	<i>No. of participants</i>	<i>Total area in each category (ha)</i>
Very small (less than 5 hectares)	4	10.7
Small (5 ha -20 ha)	8	92.4
Medium (20-100 ha)	1	72
Large (greater than 100 ha)	3	509

Most producers or participants interviewed occupy small farms (5ha -20 ha). Hall (1985) describes four characteristics of contemporary farming systems in Costa Rica and these are consistent with what I have observed in the study region as well. Farms are dedicated to permanent cultivation and almost exclusively dedicated to crop and livestock production. They are commercial enterprises. Although subsistence crops play an important role in providing food for families, for the most part, producers grow commercial crops and livestock for sale and/or export. Finally, of farming systems in Costa Rica, Hall (1985:140) describes, "in contrast to many other Latin American countries, there is a high proportion of owner-occupied farms". In addition, it is important to acknowledge that because export crops are grown in the vast majority of farms in Costa Rica, price fluctuations in international markets directly impact on a producer's ability to support his/her family. A summary of land uses observed on farms visited in the Los Cusingsos/Las Nubes region is presented in Table 2. Coffee is, by far, the most important crop in the study region and in Pérez Zeledón and may have the greatest potential as an ecologically sustainable land use practice.

The Conservation Challenge: Sun Coffee and other "Technified" Forms of Growing Coffee

Coffee production in Costa Rica, as in many other countries in Latin America, is undergoing a transformation (in some areas the transition is complete e.g., in Alajuela on the slopes of Poas Volcano) from traditionally grown shade coffee systems to a modern system of coffee production. Sun coffee represents the most "technified" form of coffee production and under this system the highest yields of coffee are

Table 2: Description of the principal land uses observed in the farms visited (n=16).

Farms with coffee	13
Farms with sugar cane	9
Farms with coffee and sugar cane	8
Farms with pastures (ranging from 3/4 - 80 manzanas) (1 manzana=0.69 ha)	6
Farms with coffee, sugar cane and pasture	5

obtained. “Technification” includes the removal and/or reduction of shade species, the predominant use of dwarf species of coffee plants that are high yielding, and high inputs of fertilizers and pesticides (Rice, 1998; and Perfecto *et al.* 1996).

The initial push to “technify” coffee production grew out of fear that a fungal disease, coffee leaf rust, would damage crops upon its arrival to Latin America approximately 30 years ago (Rice & Ward, 1996). One response of the coffee industry was the reduction and/or removal of shade trees over coffee plants. Since then, however, producers’ fears of coffee leaf rust have proven to be relatively unfounded and the driving force now is to increase productivity of coffee plants (Perfecto, Rice, Greenberg & Van der Voort, 1996).

“Technified” coffee management is not without ecological costs. These systems are prone to soil and water run off (Perfecto *et al.* 1996) and are sustainable only because of financing and agrochemicals (Muschler, 1997). In contrast, traditional systems of coffee production include a high diversity of shade species in several stratified levels with low or no inputs of pesticides, fertilizers, and herbicides (Rice, 1998 and Perfecto *et al.* 1996). Under traditional systems obtained coffee yields of coffee, however, are significantly less than in technified systems. Traditional and sun coffee systems are part of a continuum of coffee management techniques with traditional or rustic shade at one end and sun coffee at the other (Rice, 1993). Table 3 summarizes some of the key differences between highly “technified” coffee production and traditional coffee production.

The Conservation Opportunity: A Renewed Interest in Shade Grown Coffee

Shade grown coffee is an important ecologically sustainable practice that may be complementary to adjacent protected areas. Shade trees, in addition to providing economic benefits to producers through products like fruits and firewood, may also curb environmental degradation associated with high input monoculture coffee plantations, such as ground water pollution and soil erosion (in coffee farms with steep slopes) (Beer *et al.* 1998 and Rice, 1993). These environmental costs (and externalities to coffee production) are gaining attention not only locally but regionally and nationally as well and have “led to renewed interest in the use of shade trees in areas where they had previously been eliminated” (Beer *et al.* 1998:140).

Table 3: Description of key characteristics from two coffee growing systems.

Sun (or highly technified) coffee	Shade grown (traditional) coffee
<ul style="list-style-type: none"> • Few or no trees grown over coffee, plants have been selected for ability to grow in open sun • Dwarf varieties of coffee planted, and packed tightly together • Requires high amounts of pesticides and fertilizers • Increased productivity (higher yields of coffee) • Increased soil run off • Ground and water pollution due to use of pesticides and fertilizers • Supports very low levels of biodiversity • High cost of production 	<ul style="list-style-type: none"> • Stratified levels and greater diversity of shade trees over coffee plants • Traditional varieties of coffee plants grown • Less fertilizers and pesticides required, if any at all in some systems • Lower productivity but added income from shade tree products (e.g., fruits) and from shade trees (through harvesting) • Stable more reliable levels of production • Supports a high level of biodiversity and may be a refuge for biodiversity • Healthier for farm and for farming families • Cost of production is decreased due to less applications of inputs (e.g., fertilizers, pesticides)

When asked about the role of shade in incidences of diseases and pests, some producers in the region stated that shade trees are important and that pests are a natural aspect of coffee production. Rather than trying to eliminate all fungal diseases and pests with chemicals, some producers recognize that the presence of pests “is normal ecology”. After spending many years spraying chemicals, Juan acknowledged, “There are always going to be pests and diseases, we are going to see if we can live without using products [chemicals]”. Mariano Ruíz Abarca, Head of Agricultural Operations, CoopeAgri, a local cooperative in the region that processes coffee (pers. comm., 2000) added, “it is illogical, we have the most advanced technologies in coffee production and it is causing more destruction... destroying soils and contaminating with chemicals”. He maintains that with shade and less inputs of pesticides, an equilibrium and stability are achieved between coffee, pests and the environment and that there is more of an opportunity for biological agents to control the pathogens. There appears to be a renewed interest among a small number of producers in the study region in using shade trees with less inputs in coffee production.

In spite of a renewed interest in shade, several barriers to growing shade grown coffee remain in the study region and these are summarized in Table 4.

Table 4: Barriers to the promotion of shade grown coffee in the study region.

- Lingering fear among producers that increased shade will facilitate the spread of fungal diseases and damage crops
- Reduced productivity, lesser yields than sun coffee
- Lesser yields mean producers need to be paid a premium for producing a more environmentally friendly coffee
- Producers' own preferences of coffee management styles
- Lack of market demand for shade grown coffee
- Certification of shade coffee is expensive for individual small producers
- Risk (on behalf of producers)
- A cost/benefit analysis is needed to demonstrate to producers the economic benefits of increasing shade in systems

Challenges that Originate From Within the Communities of Santa Elena and Quizarrá

From the interviews and community meetings with both adults and youth in the communities, it is evident that there are several other barriers to regional conservation and development. Two of these barriers as articulated by community leaders are:

1. "There is a lack of organization in the communities. Almost no one wants to work for the development of the communities".
2. Women have limited participation on administrative affairs in the communities.

Community leaders and youth in the community also noted a lack of leadership as a problem. These data provide critical contextual information within which future conservation projects will ultimately be situated. Furthermore, my work with women and young people of the communities is an important vehicle for establishing trust and for gaining support for conservation initiatives. Dr. Julio Calvo adds, if women and young people support a conservation initiative in the communities it will have a stronger basis for support and survival than if only men supported the initiative.

Discussion and Conclusion

Furthermore, changes occurring at the landscape level and in land use systems outside of protected areas have drawn conservation professionals into arenas that traditionally have been overlooked or ignored in terms of their potential for biodiversity conservation (e.g., in agricultural systems such as commercial coffee production) (Pimentel *et al.* 1992, Vandermeer & Perfecto, 1995 and Perfecto *et al.* 1996). One of the important and presumed landscape changes in the study region was the relatively recent loss and fragmentation of forests outside of Los Cusingos. Although my study demonstrated that the forests were cleared and fragmented much earlier (several decades earlier), the findings support the importance of ground truthing and, temporal and spatial variations in the study of deforestation. Tempo-

rally, deforestation in the study region is now acknowledged to be more historical in nature than a relatively recent phenomenon. This, however, does not lessen the urgency for the design and implementation of ecologically sustainable practices within the corridor between Los Cusingos and Las Nubes. In fact, given another significant landscape change that has occurred in the study region and in coffee production, ecologically sustainable practices such as shade coffee are all the more important and necessary.

Outside of the protected areas, heavy deforestation has contributed to the near isolation of Los Cusingos from other forests (except in the south west of the sanctuary). Voluntary adoption of shade coffee in farms could result in a forested corridor connecting Los Cusingos to Las Nubes via the Peñas Blancas River. Systems of shaded coffee with low inputs and high diversity can be managed in a manner that is compatible with conserving a high degree of biodiversity (Perfecto *et al.* 1996). As Sánchez-Azofeifa *et al.* (1999:410) state, "it is unlikely that all existing forest remnants [in Costa Rica] can be brought under protection and it is likely that, as forests outside of protected areas disappear, the pressure on protected areas will grow". Thus, initiatives such as shade coffee in the study region may take pressures off protected areas, increase the habitat for species in the region and ultimately connect Los Cusingos to Chirripó National Park.

There are barriers to the promotion of shade coffee that will need to be addressed if a project is to be successful in the study region. First it is imperative to acknowledge that it is the decision of the producer and that the preferences, experiences and interests of each producer will influence his/her decision to plant (or not to) shade. Secondly, 'too much' shade is still feared by producers and the effects of an aggressive campaign against shade from previous decades linger.

Notes

- ¹ This paper is based on the author's Master's¹ research titled, *Community-based Participation in Costa Rica: A Case Study from Southern Costa Rica* from York University's Faculty of Environmental Studies, 2000.
- ² First level of political division in Costa Rica is the province, of which there are seven. The next level of division is the cantón. Local government is administered through the respective cantón.
- ³ Premontane rainforests receive 4000-8000mm of precipitation whereas premontane wet forests receive 2000 -4000mm.
- ⁴ Sandra Znajda's Master's thesis is titled, "Habitat Conservation, Avian Diversity and Coffee Agrosystems in Southern Costa Rica", from York University's Faculty of Environmental Studies, 2000.
- ⁵ On a map with a scale of 1: 200 000, 1 cm² is equivalent to 400 ha (Bolaños, R., TSC, pers. comm.).

Acknowledgements

Funding for this research, including two field seasons in Costa Rica was provided

by the Fisher Fund for Neotropical Conservation, CIDA, IDRC, and the Faculty of Environmental Studies Research and Travel Grant Fund.

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